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10/685,140	10/14/2003	Clifford I. Drowley	SMal.7215	4511

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EXAMINER	
YAM, STEPHEN K	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/685,140	Applicant(s) DROWLEY ET AL.	
	Examiner Stephen Yam	Art Unit 2878	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 September 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *43-56* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *43-56* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20070925*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

This action is in response to Amendments and remarks filed on September 25, 2007. Claims 43-56 are currently pending.

Claim Objections

1. Claim 55 is objected to because of the following informalities:

In Claim 55, "said apertures" lacks proper antecedent basis.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 43 and 55 are rejected under 35 U.S.C. 102(b) as being anticipated by Miyano US Patent No. 5,610,390.

Regarding Claim 43, Miyano teaches (see Fig. 2, 3) an imaging system, comprising a two-dimensional array (see Fig. 4) of photosensors (12), each photosensor having a center point (see Fig. 3, 4), a non-telecentric lens (see Col. 3, lines 44-45) positioned over said two-dimensional array of photosensors, a two-dimensional array of microlenses (20) (see Fig. 2) positioned over said two-dimensional array of photosensors (see Fig. 2), each microlens being associated with a corresponding photosensor (see Fig. 2), each microlens having a center point

(see Fig. 2, 3), said microlens positioned over said corresponding photosensor such that a center point of a microlens is offset from a center point of a corresponding photosensor (see Fig. 2), each offset having an amount and a direction (see Fig. 4) such that said amounts and directions spatially vary across said two-dimensional array of photosensors (see Fig. 4), said spatial variation being determined based on a variation of a chief ray angle of said non-telecentric lens across a focal surface of the non-telecentric lens (see Fig. 3B and Col. 3, lines 53-65 and Col. 4, lines 1-13) and optical properties of said two-dimensional array of photosensors and microlenses such that light sensitivity of each pixel is maximized (see Col. 2, lines 59-62 and Col. 4, lines 55-58).

Regarding Claim 55, Miyano teaches (see Fig. 2) apertures (14) positioned over a corresponding photosensor to block a substantial part of light that does not pass through said corresponding microlens (see Fig. 2).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 43-47, 49-51, 53, 54, and 56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. US Patent No. 6,518,640 in view of Miyano.

Regarding Claim 43, Suzuki et al. teach (see Fig. 1, 2, 6-8) an imaging system, comprising: a two-dimensional array (see Fig. 1) of photosensors (102/152), each photosensor

having a center point (see Fig. 2, 6, 8); a non-telecentric lens (167-1) (see Fig. 8b) positioned over said two-dimensional array of photosensors (see Fig. 8b); and a two-dimensional array of microlenses (107/157) positioned over said two-dimensional array of photosensors (see Fig. 2, 6, 8), each microlens being associated with a corresponding photosensor (see Fig. 2, 6, 8), each microlens having a center point (see Fig. 2, 6, 8); said microlens being positioned over said corresponding photosensor such that a center point of a microlens is offset from a center point of a corresponding photosensor (see Col. 10, lines 41-47 and Col. 145, lines 11-23, 46-49), each offset having an amount and a direction such that said amounts and directions spatially vary across said two-dimensional array of photosensors (see Col. 10, lines 41-47 and Col. 14, lines 10-14, 46-49); said spatial variation being determined based on optical characteristics of said non-telecentric lens and optical properties of said two-dimensional array of photosensors and said microlenses such that light sensitivity of each pixel is maximized (see Col. 2, lines 26-33 and Col. 14, lines 26-31). Suzuki et al. do not teach the spatial variation determined based on a variation of a chief ray angle of said non-telecentric lens across a focal surface of the non-telecentric lens and optical properties of said two-dimensional array of photosensors and microlenses such that light sensitivity of each pixel is maximized. Miyano teaches (see Fig. 2, 3) a similar system with a two-dimensional array (see Fig. 4) of photosensors (12) and a non-telecentric lens (see Col. 3, lines 44-45) with a microlens (20) associated with a corresponding photosensor (see Fig. 2) such that a center point of a microlens is offset from a center point of a corresponding photosensor (see Fig. 2) with the offset spatially varying across the two-dimensional array of photosensors (see Fig. 4), with the spatial variation determined based on a variation of a chief ray angle of said non-telecentric lens across a focal surface of the non-

telecentric lens (see Fig. 3B and Col. 3, lines 53-65 and Col. 4, lines 1-13) and optical properties of said two-dimensional array of photosensors and microlenses such that light sensitivity of each pixel is maximized (see Col. 2, lines 59-62 and Col. 4, lines 55-58). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the spatial variation determined based on a variation of a chief ray angle of said non-telecentric lens across a focal surface of the non-telecentric lens and optical properties of said two-dimensional array of photosensors and microlenses such that light sensitivity of each pixel is maximized, as taught by Miyano, in the system of Suzuki et al., to provide improved principal ray alignment between the object of interest and the photosensor for optimal light flux and a brighter image in low-light conditions.

Regarding Claim 49, Suzuki et al. teach (see Fig. 1, 2, 6-8) an imaging system, comprising: a two-dimensional array (see Fig. 1) of photosensors (102/152), each photosensor having a center point (see Fig. 2, 6, 8); a non-telecentric lens 167-1) (see Fig. 8b) positioned over said two-dimensional array of photosensors; and a color filter array (104/154) positioned over said two-dimensional array of photosensors (see Fig. 2, 6, 8), said color filter array including a plurality of color filter areas(see Fig. 2, 6, 8), each color filter area being associated with a corresponding photosensor and having a center point (see Fig. 2, 6, 8); said color filter area being positioned over said corresponding photosensor such that said center point of said color filter area is offset from said center point of said corresponding photosensor (see Col. 10, lines 23-31), each offset having an amount and a direction such that said amounts and directions spatially vary across said two-dimensional array of photosensors (see Col. 10, lines 28-40); said spatial variation being determined based on optical characteristics of said non-telecentric lens and

optical properties of said two-dimensional array of photosensors and said color filter areas such that crosstalk is minimized (see Col. 10, lines 32-40 and Col. 12, lines 6-10). Suzuki et al. do not teach the spatial variation determined based on a variation of a chief ray angle of said non-telecentric lens across a focal surface of the non-telecentric lens and optical properties of said two-dimensional array of photosensors and microlenses such that light sensitivity of each pixel is maximized. Miyano teaches (see Fig. 2, 3) a similar system with a two-dimensional array (see Fig. 4) of photosensors (12) and a non-telecentric lens (see Col. 3, lines 44-45) with a microlens (20) associated with a corresponding photosensor (see Fig. 2) such that a center point of a microlens is offset from a center point of a corresponding photosensor (see Fig. 2) with the offset spatially varying across the two-dimensional array of photosensors (see Fig. 4), with the spatial variation determined based on a variation of a chief ray angle of said non-telecentric lens across a focal surface of the non-telecentric lens (see Fig. 3B and Col. 3, lines 53-65 and Col. 4, lines 1-13) and optical properties of said two-dimensional array of photosensors and microlenses such that light sensitivity of each pixel is maximized (see Col. 2, lines 59-62 and Col. 4, lines 55-58). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the spatial variation determined based on a variation of a chief ray angle of said non-telecentric lens across a focal surface of the non-telecentric lens and optical properties of said two-dimensional array of photosensors and microlenses such that light sensitivity of each pixel is maximized, as taught by Miyano, in the system of Suzuki et al., to provide improved principal ray alignment between the object of interest and the photosensor for optimal light flux and a brighter image in low-light conditions.

Regarding Claim 44, Suzuki et al. teach a color filter array (104/154) positioned over said two-dimensional array of photosensors.

Regarding Claim 45, Suzuki et al. teach said color filter array comprises a plurality of color filter areas (see Fig. 8 and Col. 10, lines 23-47), each color filter area being associated with a corresponding photosensor and having a center point (See Fig. 2, 6, 8); said color filter area being positioned over said corresponding photosensor such that said center point of said color filter area is offset from said center point of said corresponding photosensor (see Col. 10, lines 23-31), each offset having an amount and a direction such that said amounts and directions spatially vary across said two-dimensional array of photosensors (see Col. 10, lines 28-40); said spatial variation being determined based on optical characteristics of said non-telecentric lens and optical properties of said two-dimensional array of photosensors and said color filter areas such that crosstalk is minimized (see Col. 10, lines 32-40 and Col. 12, lines 6-10).

Regarding Claims 47 and 51, Suzuki et al. teach said aperture is positioned over said corresponding photosensor such that said center point of said aperture is offset from said center point of said corresponding photosensor (See Fig. 8 and Col. 13, lines 49-59 and Col. 17, lines 44-52), each offset having an amount and a direction such that said amounts and directions spatially vary across said two-dimensional array of photosensors (see Col. 13, line 66 to Col. 14, line 5); said spatial variation being determined based on optical characteristics of said non-telecentric lens and optical properties of said two-dimensional array of photosensors and said apertures such that stray light signals are minimized (see Col. 13, line 66 to Col. 14, line 6 and Col. 17, line 62 to Col. 18, line 2).

Regarding Claim 53, Suzuki et al. teach (see Fig. 1, 2, 6-8) an imaging system, comprising: a two-dimensional array (see Fig. 1) of photosensors (102/152), each photosensor having a center point (see Fig. 2, 6, 8); a non-telecentric lens (167-1) (see Fig. 8b) positioned over said two-dimensional array of photosensors; and a layer of transmissive apertures (159) positioned over said two-dimensional array of photosensors, each aperture being associated with a corresponding photosensor and having a center point (see Fig. 2, 6, 8); said aperture being positioned over said corresponding photosensor (see Fig. 2, 6, 8) such that said center point of said aperture is offset from said center point of said corresponding photosensor (See Fig. 8 and Col. 13, lines 49-59 and Col. 17, lines 44-52), each offset having an amount and a direction such that said amounts and directions spatially vary across said two-dimensional array of photosensors (see Col. 13, line 66 to Col. 14, line 5); said spatial variation being determined based on optical characteristics of said non-telecentric lens and optical properties of said two-dimensional array of photosensors and said apertures such that stray light signals are minimized (see Col. 13, line 66 to Col. 14, line 6 and Col. 17, line 62 to Col. 18, line 2). Suzuki et al. do not teach the spatial variation determined based on a variation of a chief ray angle of said non-telecentric lens across a focal surface of the non-telecentric lens and optical properties of said two-dimensional array of photosensors and microlenses such that light sensitivity of each pixel is maximized. Miyano teaches (see Fig. 2, 3) a similar system with a two-dimensional array (see Fig. 4) of photosensors (12) and a non-telecentric lens (see Col. 3, lines 44-45) with a microlens (20) associated with a corresponding photosensor (see Fig. 2) such that a center point of a microlens is offset from a center point of a corresponding photosensor (see Fig. 2) with the offset spatially varying across the two-dimensional array of photosensors (see Fig. 4), with the spatial variation determined

based on a variation of a chief ray angle of said non-telecentric lens across a focal surface of the non-telecentric lens (see Fig. 3B and Col. 3, lines 53-65 and Col. 4, lines 1-13) and optical properties of said two-dimensional array of photosensors and microlenses such that light sensitivity of each pixel is maximized (see Col. 2, lines 59-62 and Col. 4, lines 55-58). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the spatial variation determined based on a variation of a chief ray angle of said non-telecentric lens across a focal surface of the non-telecentric lens and optical properties of said two-dimensional array of photosensors and microlenses such that light sensitivity of each pixel is maximized, as taught by Miyano, in the system of Suzuki et al., to provide improved principal ray alignment between the object of interest and the photosensor for optimal light flux and a brighter image in low-light conditions.

Regarding Claim 54, Suzuki et al. teach (see Fig. 1, 2, 6-8) an imaging system, comprising: a two-dimensional array (see Fig. 1) of photosensors (102/152), each photosensor having a center point (see Fig. 2, 6, 8); a non-telecentric lens (167-1) (see Fig. 8b) positioned over said two-dimensional array of photosensors; a two-dimensional array of microlenses (107/158) positioned over said two-dimensional array of photosensors (see Fig. 2, 6, 8), each microlens being associated with a corresponding photosensor (see Fig. 2, 6, 8), each microlens having a center point (see Fig. 2, 6, 8); a color filter array (104/154) positioned over said two-dimensional array of photosensors (see Fig. 2, 6, 8), said color filter array including a plurality of color filter areas (see Fig. 2, 6, 8), each color filter area being associated with a corresponding photosensor and having a center point (see Fig. 2, 6, 8); and a layer of transmissive apertures (159) positioned over said two-dimensional array of photosensors (see Fig. 8), each aperture

being associated with a corresponding photosensor and having a center point (see Fig. 8); said microlens being positioned over said corresponding photosensor (see Fig. 8) such that said center point of said microlens is offset from said center point of said corresponding photosensor (see Col. 10, lines 41-47 and Col. 145, lines 11-23, 46-49), each microlens offset having an amount and a direction such that said amounts and directions spatially vary across said two-dimensional array of photosensors (see Col. 10, lines 41-47 and Col. 14, lines 10-14, 46-49); said color filter area being positioned over said corresponding photosensor such that said center point of said color filter area is offset from said center point of said corresponding photosensor (see Col. 10, lines 23-40, 60-63), each color filter area offset having an amount and a direction such that said amounts and directions spatially vary across said two-dimensional array of photosensors (see Col. 10, lines 28-40); said aperture being positioned over said corresponding photosensor such that said center point of said aperture is offset, in said first direction, from said center point of said corresponding photosensor (see Fig. 8 and Col. 13, lines 49-59 and Col. 17, lines 44-52), each aperture offset having an amount and a direction such that said amounts and directions spatially vary across said two-dimensional array of photosensors (see Col. 13, line 66 to Col. 14, line 5); said spatial variation of said microlens offsets being determined based on optical characteristics of said non-telecentric lens and optical properties of said two-dimensional array of photosensors and said microlenses such that light sensitivity of each pixel is maximized (see Col. 2, lines 26-33 and Col. 14, lines 26-31); said spatial variation of said color filter area offsets being determined based on optical characteristics of said non-telecentric lens and optical properties of said two-dimensional array of photosensors and said color filter areas such that crosstalk is minimized (see Col. 10, lines 32-40 and Col. 12, lines 6-10); said spatial variation of

said aperture offsets being determined based on optical characteristics of said non-telecentric lens and optical properties of said two-dimensional array of photosensors and said apertures such that stray light signals are minimized (see Col. 13, line 66 to Col. 14, line 6 and Col. 17, line 62 to Col. 18, line 2). Suzuki et al. do not teach the spatial variation determined based on a variation of a chief ray angle of said non-telecentric lens across a focal surface of the non-telecentric lens and optical properties of said two-dimensional array of photosensors and microlenses such that light sensitivity of each pixel is maximized. Miyano teaches (see Fig. 2, 3) a similar system with a two-dimensional array (see Fig. 4) of photosensors (12) and a non-telecentric lens (see Col. 3, lines 44-45) with a microlens (20) associated with a corresponding photosensor (see Fig. 2) such that a center point of a microlens is offset from a center point of a corresponding photosensor (see Fig. 2) with the offset spatially varying across the two-dimensional array of photosensors (see Fig. 4), with the spatial variation determined based on a variation of a chief ray angle of said non-telecentric lens across a focal surface of the non-telecentric lens (see Fig. 3B and Col. 3, lines 53-65 and Col. 4, lines 1-13) and optical properties of said two-dimensional array of photosensors and microlenses such that light sensitivity of each pixel is maximized (see Col. 2, lines 59-62 and Col. 4, lines 55-58). It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the spatial variation determined based on a variation of a chief ray angle of said non-telecentric lens across a focal surface of the non-telecentric lens and optical properties of said two-dimensional array of photosensors and microlenses such that light sensitivity of each pixel is maximized, as taught by Miyano, in the system of Suzuki et al., to provide improved principal ray alignment between the

object of interest and the photosensor for optimal light flux and a brighter image in low-light conditions.

Regarding Claim 56, Suzuki et al. teach (see Fig. 6) each of said apertures positioned over a corresponding photosensor to block a substantial part of light that does not pass through said corresponding microlens (see Fig. 6).

6. Claims 48 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki et al. in view of Miyano, further in view of Asai et al. US Patent No. 5,986,704.

Suzuki et al. in view of Miyano teach the imager in Claims 12, 24, 31, 37, 46, and 50, according to the appropriate paragraph above. Suzuki et al. also teach said layer of transmissive apertures is a layer of apertures (see Fig. 6, 8) such that the layer blocks (156) stray radiation and the apertures allow radiation to pass therethrough (see Fig. 6). Suzuki et al. do not teach the layer as a metal layer. Asai et al. teach (See Fig. 7A) a similar device with a layer of transmissive apertures (37a) as a metal layer of apertures (see Col. 1, lines 52-55) such that the metal layer blocks stray radiation (see Fig. 7A). it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the layer as a metal layer as taught by Asai et al. in the imager of Suzuki et al. in view of Miyano, to provide efficient blockage and reflection of oblique light, and since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Response to Arguments

7. Applicant's arguments with respect to claims 43-56 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen Yam whose telephone number is (571)272-2449. The examiner can normally be reached on Monday-Friday 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Georgia Epps can be reached on (571)272-2328. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

SY

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